Abstract
This user guide details how update the end-user software application in the MAX32660 through the in-application programming, plus how to compile and program the MAX32660 bootloader code into the MAX32660 evaluation system (MAX32660-EVSYS). Details on the MAX32660 bootloader can be found in the MAX32660 Bootloader User Guide.

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Introduction

This application note provides the instructions to program the MAX32660 bootloader code into the MAX32660 evaluation system (MAX32660-EVSYS) and to program example host code into the MAX32630FTHR development platform.

The document also gives details related to hardware setup and application programming by using the MAX32660 bootloader and example host code. Appendices give information on compiling the MAX32666 bootloader code to evaluate the open-source MAX32666 bootloader code provided by Maxim in their own environment.

Note that the screenshots may differ according to the software versions, but the steps will be same.
System Requirements
To compile and program the MAX32660 bootloader code into the MAX32660-EVSYS, the minimum requirements are as follows:

- Windows® PC
  - Windows 10, Windows 7
- OpenSSL
  - Maxim Toolchain Software (more information, including download and installation instructions, is in this document)
- MAX32660-EVSYS and micro-USB cable
- MAX32630FTHR and micro-USB cable
- MAX32625PICO evaluation kit (EV kit) and micro-USB cable
- Test wires to connect the MAX32660-EVSYS and MAX32630FTHR
- User should download and copy the max32660_demo folder inside of the release package to your PC under the C:\maximintegrated folder.

Maxim Toolchain Installation
To install the Maxim Toolchain to your PC, use the following steps:

1. Download the Arm® Cortex® Toolchain here.
2. After downloading is complete, double-click ARM Cortex Toolchain.exe and use the default settings and select Next until finished.
3. Select Install the Driver/Run it Anyway when Windows says that it does not recognize the driver.
4. In the folder C:\Maxim, double-click on updates.bat.
   - If updates.bat fails, it may be necessary to open it in a text editor and call the commands manually.

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Windows is a registered trademark of Microsoft Corporation.
MAX32660 Bootloader Code

The following step-by-step instructions provide details for programming the MAX32660 bootloader code and user binary loading in the MAX32660 through the bootloader application.

Programming the MAX32660 with the Bootloader Firmware

To program the MAX32660 bootloader code into the MAX32660-EVSYS, use the following steps:

1. Use jumper J1 to select the target VDD as 1.8V.
2. Connect the micro-USB cable to the MAX32660-EVSYS and the PC.

![MAX32660-EVSYS evaluation system.](image)

3. In the MinGW® window that is created after double-clicking `msys.bat` in the `C:\Maxim\Toolchain\msys\1.0` directory, navigate to the demo directory by typing in the following command, which uses forward slashes:

```
cd c:/maximintegrated/max32660_demo
```

4. If your MAX32660 has been used for another version of the bootloader or for other projects, then it will be necessary to clear the flash memory of the MAX32660. In the MinGW window, type the following:

```
openocd -s $MAXIM_PATH/share/openocd/scripts -f interface/cmsis-dap.cfg -f
        target/max32660.cfg -c "init;halt;max32xxx mass_erase 0;exit"
```

5. To flash the bootloader, type the following:

```
openocd -s $MAXIM_PATH/share/openocd/scripts -f interface/cmsis-dap.cfg -f
        target/max32660.cfg -c "program bootloader_max32660_vx.x.x.elf verify reset;exit"
```
Programming the MAX32630FTHR

To program example host code into the MAX32630FTHR, use the following steps:

1. Connect the grey 10-pin connector to the MAX32630FTHR and the MAX32625PICO board.
2. Connect the micro-USB cable to the MAX32625PICO and the PC.
3. Connect the micro-USB cable to the MAX32630FTHR and the PC.
4. Wait a few minutes for the Windows driver to install, then verify that it is installed correctly.
   a. In the Windows 10 search box, type **Control Panel** (or for Windows 7, click **Control Panel** on the right side of the **Start Menu**). Either click **Hardware and Sound**, then **Device Manager**, or type **Device Manager** in the search box in the upper right.
   b. If the drivers have correctly installed, you should see one port listed as **mbed Serial Port** for the MAX32625PICO. Note the COM port number for the USB serial device.
c. If you see the following, then you will need to install the correct Windows driver:

Figure 4. Serial port list.

d. Download the Arm Mbed® Windows serial port driver [here].

e. For Windows 10, run `mbedWinSerial_16466.exe` by double-clicking it.

f. For Windows 7,
   i. Right-click on the `mbedWinSerial_16466.exe` file, and extract to a folder.
   ii. Inside that folder, edit and add the following to the `mbedSerial_x64.inf` that the following italicized vid's and pid's are in the `[Devices]` section.

   ```
   [Devices]
   %S_DeviceDesc1%=Install,USB\VID_1F00&PID_2012&MI_01
   %S_DeviceDesc1%=Install,USB\VID_1F00&PID_2012&MI_01
   %S_DeviceDesc1%=Install,USB\VID_1F00&PID_2012&MI_01
   %S_DeviceDesc1%=Install,USB\VID_1F00&PID_2012&REV0100
   %S_DeviceDesc1%=Install,USB\VID_1F00&PID_2012
   ```
   iii. Right-click on the CDC device warning, Update Driver Software, Browse My Computer for driver software, and enter the folder name from above. Wait at least 3 to 5 minutes for the driver to install.
   iv. If there is still an issue, run the `mbed_xxx.exe` file.

5. In the MinGW window, navigate to the `max32660_demo` directory with the following command, which uses forward slashes:

   `cd c:/maximintegrated/max32660_demo`

6. In the MinGW window, type in the following:

   `openocd -s $MAXIM_PATH/share/openocd/scripts -f interface/cmsis-dap.cfg -f target/max3263x.cfg -c "program max32630fthr-host-vx.x.bin verify reset exit"`

   Alternatively, the .bin file may be dragged and dropped into the correct DAPLINK drive.

Mbed is a registered trademark of Arm Limited.
7. Press the reset button on the MAX32630FTHR, as shown in Figure 7.

8. Verify that the LED on the MAX32630FTHR is blinking, as shown in Figure 8.
Hardware Setup

Connect the MAX32630FTHR and MAX32660 with test wires according to Table 1. Pin diagrams for the MAX32630FTHR and MAX32660-EVSYS are given in Figure 9 and Figure 10, respectively.

Table 1. Pin Connection between the MAX32630FTHR and MAX32660-EVSYS

<table>
<thead>
<tr>
<th>PIN FUNCTION</th>
<th>MAX32660-EVSYS</th>
<th>MAX32630FTHR</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBL GPIO</td>
<td>P0.1</td>
<td>P5.4</td>
</tr>
<tr>
<td>I2C0_SCL</td>
<td>P0.2</td>
<td>P3.5 + 4.7K pullup</td>
</tr>
<tr>
<td>I2C0_SDA</td>
<td>P0.3</td>
<td>P3.4 + 4.7K pullup</td>
</tr>
<tr>
<td>SPI_MISO</td>
<td>P0.4</td>
<td>P5.2</td>
</tr>
<tr>
<td>SPI_MOSI</td>
<td>P0.5</td>
<td>P5.1</td>
</tr>
<tr>
<td>SPI_SCK</td>
<td>P0.6</td>
<td>P5.0</td>
</tr>
<tr>
<td>SPI_SSEL</td>
<td>P0.7</td>
<td>P5.3</td>
</tr>
<tr>
<td>UART_TX</td>
<td>P0.8</td>
<td>P3.1</td>
</tr>
<tr>
<td>UART_RX</td>
<td>P0.9</td>
<td>P3.0</td>
</tr>
<tr>
<td>RST</td>
<td>RSTN</td>
<td>P5.6</td>
</tr>
</tbody>
</table>

Figure 9. MAX32630FTHR pin diagram.

Figure 10. MAX32660-EVSYS pin diagram.
In-Application Programming

Installing Python
To download and install Python, use the following steps:

1. Download and install Python 2.7.13 [here].
2. In the Windows search box, type `dos` and select the Command Prompt.

![Figure 11. Navigating to the Command Prompt.](image)

3. Navigate to this directory by typing the following at the DOS prompt:
   
   ```
   cd c:\maximintegrated\max32660_demo
   ```

4. Add the Python components needed by typing the following at the DOS prompt:
   
   ```
   pip install -r requirements.txt
   ```
In-Application Programming with Python

To flash the application to the MAX32660 by using the MAX32660 bootloader, use the following steps:

1. At the command prompt or in the PowerShell window, enter the following commands, replacing COMxx with the correct USB serial device COM port found in step 4b. Replace <interface> with the available interfaces such as uart, i2c, or spi.

   ```python
   python ./download_fw_over_host.py -f "Hello_World.msbl" -p "COMxx" -d 2 -c "interface"
   ```

   ![Figure 12. Downloading firmware with the download_fw_over_host Python script.](image)

2. The application has now been flashed to the chip. For advanced usage of flasher script, refer to the Firmware_downloader_usage.txt file.
Appendix A: Compiling the Bootloader Code with the Make Command

To compile the MAX32660 bootloader code with the make command, use the following steps:

1. Navigate to the max32660_bootloader_src directory in the MinGW window with the following command, which uses forward slashes:
   
   ```
   cd c:/maximintegrated/max32660_bootloader_src
   ```

2. Enter the following command in the MinGW window and wait several minutes for the command to complete:
   
   ```
   make
   ```

3. After successful compiling, the EvKit_V1_BL.elf bootloader executable will be in the C:\maximintegrated\max32660_bootloader_src\build directory.

If you want to rebuild, then enter these commands respectively:

   ```
   make clean
   ```

   ```
   make
   ```

![Figure 13. Compiling bootloader code in the MinGW window.](image)
Appendix B: Converting .bin file to .msbl file

Convert the .bin application program to an .msbl file by entering the following command in the
DOS window to program by using the bootloader:

```
msblGenWin32.exe myapplication.bin MAX32660 8192
```

Be sure that you have used correct linker file at your application. A sample linker file
(max32660.ld) can be found at max32660_bootloader_src\example\Hello_World.
## Revision History

<table>
<thead>
<tr>
<th>REVISION NUMBER</th>
<th>REVISION DATE</th>
<th>DESCRIPTION</th>
<th>PAGES CHANGED</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>2/20</td>
<td>Initial release</td>
<td>—</td>
</tr>
</tbody>
</table>

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